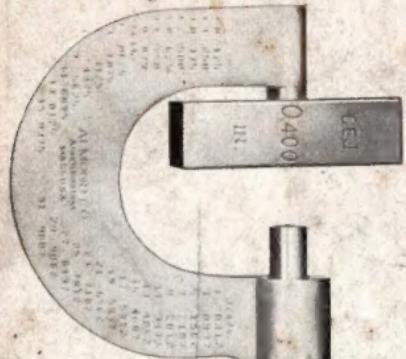


160

# almond

## MICROMETERS



Guaranteed to be  
Uniformly Accurate  
at All Readings

T. R. Almond Mfg. Co.  
Ashburnham, Mass.  
U. S. A.



No. 10  
April 1, 1920



1.8 125  
1.4 250  
1.8 375  
1.2 500  
5.0 625  
3.4 750  
7.8 875  
16ths  
1 .0625  
3 .1875  
5 .3125



32nds.  
1 .0312  
3 .0937  
5 .1562  
7 .2187  
9 .2812  
11 .3437  
13 .4062  
15 .4687  
17 .5312  
19 .5937  
21 .6562

ALMOND CO.  
ASHBURNHAM  
MASS USA

23 .7187  
25 .7812  
27 .8437  
29 .9062  
31 .9687



## Uniform Accuracy

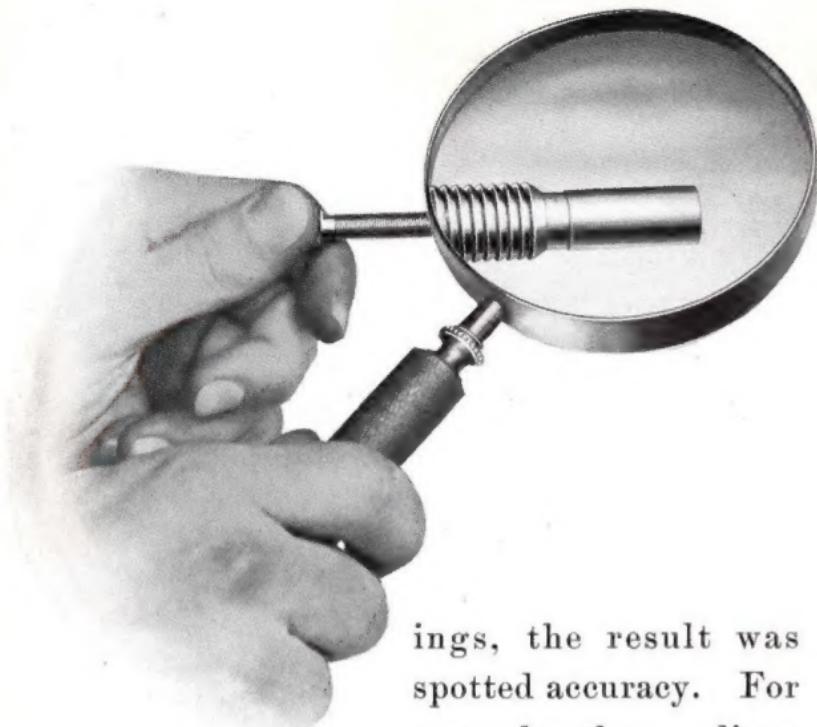
**Y**OUR micrometer looks all right," said the master mechanic, "but you'll have to show me more than looks before I'll change from a make which has been standard in this shop for fifteen years."

"Fair enough," replied the Almond salesman, "but if I can prove greater or more uniform accuracy, then it is a safe bet that you will give the micrometer a fair trial in actual practice up against the old one."

"Maybe and maybe not," was the cautious reply. "What makes you think your micrometer is more accurate?"

"The accuracy of any micrometer depends primarily upon the cut of the screw. The Almond screw is of constant pitch. You and I know how hard that is to produce. Up to a few years ago we didn't have it. We cut the thread as other manufacturers did, and followed the usual practice of correcting the screw after assembly by stretching the thread in a lapping operation with a lubricant and some sort of cutting compound. The result was a satisfactory degree of accuracy only at a relatively few predetermined points.

"Since we, as well as other manufacturers, could not possibly calibrate at all points for all read-



ings, the result was spotted accuracy. For example, the readings might be absolutely accurate at ten designated points, but between these points might be either plus or minus. So we set about designing a machine that would cut a thread of constant pitch."

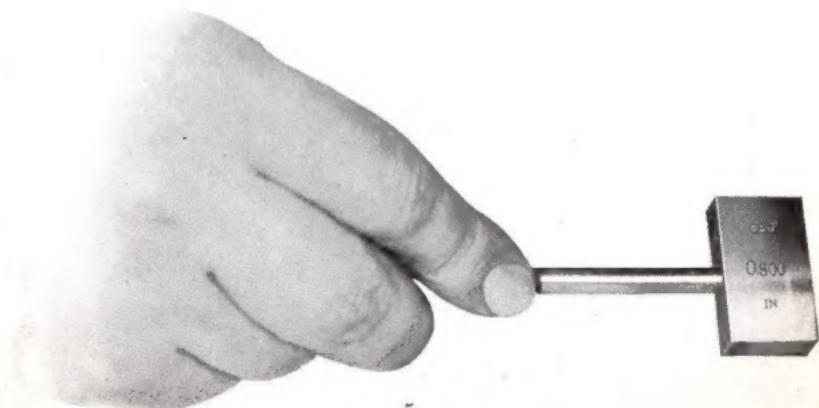
"Some job, son, cutting a perfect screw," interrupted the master mechanic.

"Yes, indeed, we realized the practical impossibility of that, but we did finally develop a machine which does produce a screw of constant pitch. The Almond screw, therefore, differs from all others, since its *final* accuracy is obtained in the original cutting, and it can therefore be assembled directly into the micrometer without cali-

bration. Let me point out another advantage. Most screws are cut with the common V thread. The Almond screw is cut with one flat wall, the so-called ratchet thread. In using a micrometer, the light touch is the accurate touch. With the Almond screw you always get the thrust against a flat, perpendicular surface. There is, therefore, not the liability to spring that there is with the thrust against a slanting surface.

"The Almond also has two other refinements which every experienced user at once appreciates. The surfaces of anvil and spindle are absolutely flat. For flatness of surface the Johansson Gauge Blocks are the recognized standard. If our anvil and spindle surfaces were not equally flat, they would not 'stick' to the gauge blocks, as shown in these illustrations, without anything to hold them together except atmospheric pressure, molecular attraction, or whatever force it is which sticks the perfectly flat surfaces together.

"In addition to being perfectly flat, the sur-



## No. 140 English Measurements 0 to 1 Inch

By 1000ths	\$7.00	With Ratchet Stop	\$8.00
By 10000ths	8.50	"	9.50

## No. 141 Metric Measurements 0 to 25 m/m

By 1-100ths m/m \$7.00 With Ratchet Stop \$8.00



faces of the Almond anvil and spindle are absolutely parallel. This is readily demonstrated by test against the parallel surfaces of any Johansson Gauge Block. Equally convincing is the simple fact that the surfaces of anvil and spindle 'stick' together exactly as the gauge blocks do."

"Seems to me you have a real micrometer," said the master mechanic, as he handled the Almond with that degree of respect which every real machinist feels toward a worthy tool. "How does it stand up in hard service?"

"So well that we are safe in taking all the responsibility of that," was the answer.



### The Almond Guarantee

*Should an inspection, adjustment, repair or renewal of any parts of an Almond Micrometer be considered advisable by Purchaser, such inspection, adjustment, repair or renewal of any parts will be made on presentation of Micrometer to us without charge.*

### Micrometer Heads

For Attaching to Machine and Tools where fine adjustment is necessary

Distance from shoulder to end  $\frac{1}{16}$  inch  
Diameter  $2\frac{7}{64}$  inch (.4218)

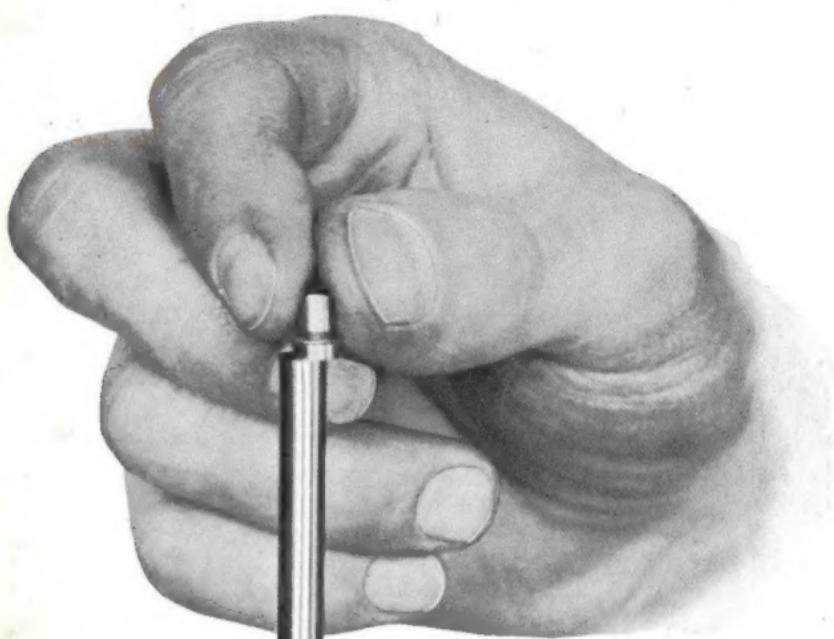
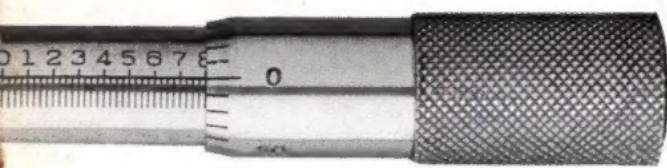
### No. 138 English Measurements

1 inch by 1000ths	\$4.50	With Ratchet Stop	\$5.50
1 " " 10000ths	6.00	" "	7.00

### No. 143 Metric Measurements

25 m/m by 1-100ths m/m	\$4.50
With Ratchet Stop	5.50





## No. 139 English Measurements No. 142 Metric Measurements

No. 139	No. 142	Each	No. 139	No. 142	Each
1-2 inch	25-50 m/m	\$6.25	12-13 inch	300-325 m/m	\$16.00
2-3 "	50-75 "	7.75	13-14 "	325-350 "	17.00
3-4 "	75-100 "	8.50	14-15 "	350-375 "	18.00
4-5 "	100-125 "	9.25	15-16 "	375-400 "	20.00
5-6 "	125-150 "	10.00	16-17 "	400-425 "	22.00
6-7 "	150-175 "	10.50	17-18 "	425-450 "	24.00
7-8 "	175-200 "	11.50	18-19 "	450-475 "	25.00
8-9 "	200-225 "	12.00	19-20 "	475-500 "	28.00
9-10 "	225-250 "	13.00	20-21 "	500-525 "	31.00
10-11 "	250-275 "	14.00	21-22 "	525-550 "	34.00
11-12 "	275-300 "	15.00	22-23 "	550-575 "	37.00
			23-24 "	575-600 "	40.00

Above list prices for English readings (by 1000ths).

Above list prices for Metric readings (by 1-100ths m/m).

Add \$1.50 to above list prices for (by 10000ths).

Add \$1.00 to above list prices for (Ratchet Stop).

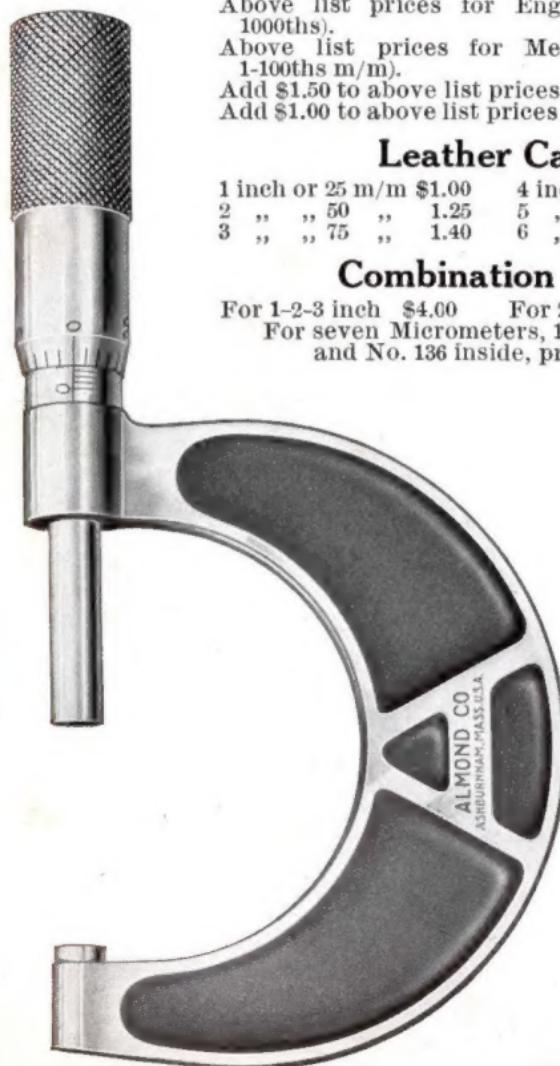
### Leather Cases

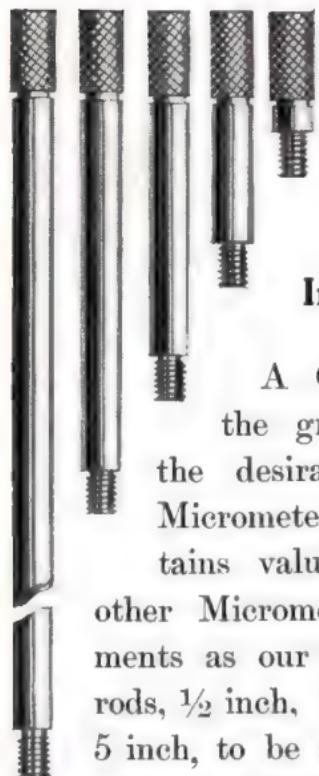
1 inch or 25 m/m	\$1.00	4 inch or 100 m/m	\$3.25
2 " " 50 "	1.25	5 " " 125 "	3.50
3 " " 75 "	1.40	6 " " 150 "	3.75

### Combination Cases

For 1-2-3 inch \$4.00 For 25-50-75 m/m \$4.00

For seven Micrometers, 1-6 inch outside  
and No. 136 inside, price \$10.00





## No. 136 Inside Micrometer Calipers

A Caliper of compactness with the greatest range. Not one of the desirable qualities of an inside Micrometer has been omitted. It contains valuable features not found in other Micrometers and has same adjustments as our No. 140 Micrometer. Five rods,  $\frac{1}{2}$  inch, 1 inch,  $1\frac{1}{2}$  inch, 2 inch and 5 inch, to be screwed into body of instrument are included. Increased capacity can be secured with additional 5-inch rods.

### Price

$1\frac{1}{2}$  to 12 inch by 1000ths, in Leather Case \$10.00

Extra Rods, each \$0.75

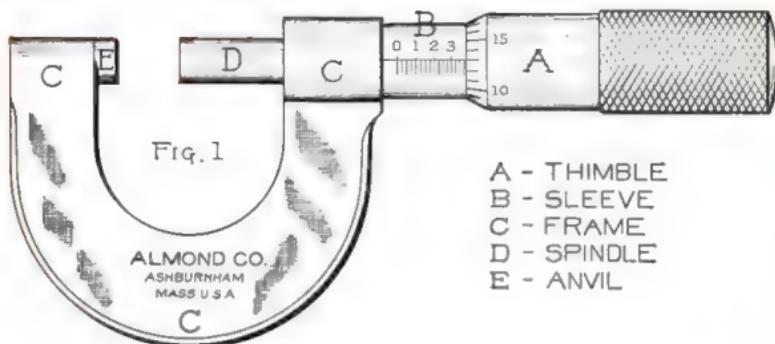
## No. 137 Thread Micrometers

### In Leather Case

### "V" and "U. S." or Whitworth Standard

0 to 1 inch	8	to 13 threads.....	\$15.00	
" "	14	" 20 "	15.00	
" "	22	" 30 "	15.00	
" "	32	" 40 "	15.00	
1 "	2 "	4 1/2 "	7 "	15.00
" "	8	" 13 "	15.00	
" "	14	" 20 "	15.00	
" "	22	" 30 "	15.00	

# Directions for Reading Micrometer Calipers



A - THIMBLE  
B - SLEEVE  
C - FRAME  
D - SPINDLE  
E - ANVIL

## Micrometers Reading to One One-Thousandth Part of an Inch (.001")

**T**HE principle of the Micrometer Caliper is that of a screw running in a nut. For the English system (reading in inches) it is customary to make the screw forty pitch.

Referring to the illustration above (Fig. 1), the thimble "A" is attached to and revolves with and as a part of the screw "D." One graduation on the sleeve "B" corresponds to one revolution of the screw, or  $\frac{1}{40}$ th of an inch, or expressed in thousandths of an inch is .025. The bevel of the thimble "A" is divided by graduations into twenty-five equal parts, each space representing one-twenty-fifth ( $\frac{1}{25}$ th) of a revolution, or  $\frac{1}{25}$ th of  $\frac{1}{40}$ th, and hence one-thousandth part of an inch (.001").

For convenience in reading, each fifth line on thimble "A" is made longer than the others and marked with numbers 0, 5, 10, 15, 20. For the same reason each fourth line of the graduations on the sleeve "B" is made longer and numbered 0, 1, 2, 3, 4, 5, 6, etc. Since each graduation on "B" is equal to one revolution of the screw, or  $\frac{1}{40}$ th of an inch, then four revolutions or four graduations are equivalent to one-tenth ( $\frac{1}{10}$ th) of an inch, or written as thousandths is .100" or one hundred one-thousandths of an inch. It follows that each succeeding four graduations also represents one-tenth (.100") of an inch, and figures 1, 2, 3, etc., indicate the number of tenths of an inch or hundreds of one-thousandths of an inch. This figure is always the first figure to the right of the decimal point.

To read a Micrometer the process is as follows : Observe the figure on the sleeve "B" nearest to the bevel edge of the thimble "A," this indicates the number of hundreds of one-thousandths, or is the first figure to the right of the decimal point. Next observe how many graduations beyond this point have been uncovered, if any, by the thimble "A." Each one of these is twenty-five one-thousandths (.025), and if there are more than one add these together (.050" or .075") and add to previous figure, making the second and third figures to right of decimal point. Next observe the graduation on the bevel of the thimble "A" and the number of it, which is nearest to or which has

passed just beyond or over the long horizontal line on the sleeve "B," and add this to the figures previously determined.

For example, the Micrometer shown in the cut (Fig. 1) is set at .388". The nearest figure to the edge of thimble "A" is 3, beyond this to the right are three more graduations exposed, or .075 or total of .375. The line on the bevel of the thimble "A" coinciding with the long horizontal line on the sleeve "B" is number 13, adding this to the above .375 makes a total of .388.

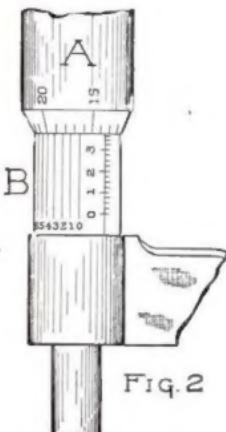


FIG. 2

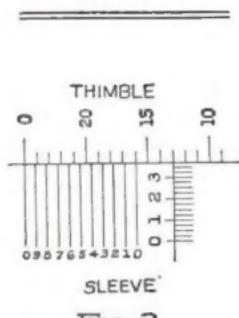


FIG. 3

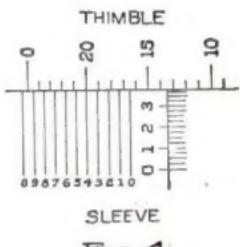


FIG. 4

## Micrometers Reading to One

### Ten-Thousandth Part of an Inch (.0001")

THE Micrometer reading to one ten-thousandth part of an inch has additional graduations around the sleeve "B," called a vernier graduation. Ten of these graduations on the sleeve "B" are equivalent to nine on the bevel of the thimble "A." (See Fig. 3.)

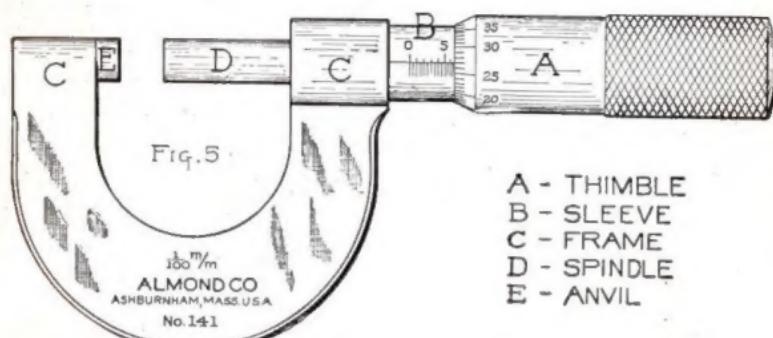
The reading of the vernier is as follows : Find the vernier graduation which coincides exactly with some graduation on the bevel of the thimble. The number of this vernier line is the number of ten-thousandths to be added to the thousandth reading, determined as previously indicated. Another way of expressing it is to say that this figure is the one in the fourth place to the right from the decimal point. Thus the reading shown in the cut (Figs. 2 and 4) is .3884, the line marked 4 being the only vernier line coinciding with a graduation on the thimble. If both vernier lines marked 0 and 0 coincide with lines on the thimble, then the reading for ten-thousandths, or the fourth place to the right of the decimal point, is zero (0), that is, the reading is exactly to thousandths. (See Fig. 3.)

## How to Read the Metric Micrometer

THE pitch of the screw "D" in the metric Micrometer is one-half millimeter (.50 m/m), that is, one revolution of the screw "D" or the thimble "A" is equivalent to one-half millimeter (.50 m/m) in measurement. The bevel on the thimble "A" is divided by graduations into fifty equal parts, and hence each graduation represents one one-hundredth of a millimeter (.01 m/m). For convenience in reading, each fifth line is made longer than the others and marked with its number 0-5-10-15-20, etc.

The sleeve "B" has graduations one-half millimeter apart, equivalent to one revolution of the thimble "A." Every alternate line or each line representing one millimeter is lengthened and each fifth millimeter line is marked with a number 0-5-10-15, etc., for convenience in reading.

To read the Micrometer the process is as follows: Observe the number of millimeters on the sleeve "B" uncovered by the edge of thimble "A," or in other words the number of the line indicating millimeters on the sleeve "B" nearest to the edge of thimble "A." This is the figure to the left of the decimal point. Then observe the number of the line on the bevel edge of the thimble "A" which coin-



A - THIMBLE  
B - SLEEVE  
C - FRAME  
D - SPINDLE  
E - ANVIL

cides most nearly with or which has passed just beyond or over the long horizontal line on the sleeve "B." This, then, is the figure to the right of the decimal point in hundredths of a millimeter (.06 or .33, etc.), provided no half millimeter line on the sleeve "B" has been uncovered by the edge of the thimble "A." If a half millimeter graduation (.50 m/m) on the sleeve "B" shows next to the edge of the thimble "A," then .50 m/m must be added to the reading observed on the thimble "A." For example, the Micrometer shown in the cut (Fig. 5) reads 6.77 m/m. The millimeter line on the sleeve "B" nearest to the edge of the thimble "A" is the sixth m/m graduation, hence we have 6.00 m/m. The line on the bevel edge of thimble "A," which coincides with the long horizontal line on sleeve "B" is 27; but a half millimeter line on the sleeve "B" beyond the sixth millimeter graduation shows between it and the edge of thimble "A," and therefore a half millimeter (.50 m/m) must be added to the reading 27 on the thimble "A," making a reading of 77 or total of 6.77 m/m.

## Adjustment of Micrometer

To adjust the Micrometer for wear of the measuring surfaces, that is, the surface of the anvil "E" and the end of the screw "D," the sleeve "B" may be rotated. For this purpose a small spanner wrench is furnished with each Micrometer, which fits a small hole in the sleeve "B." The long horizontal line on the sleeve "B" must be made to coincide exactly with the zero line on the thimble "A" when the screw "D" is set down against the anvil "E" in the case of the one inch Micrometer. In the large sizes a standard plug gauge or end measure must be placed between the measuring surfaces when adjusting.

To adjust for wear of the screw and nut a tension nut is provided and is operated by the aforementioned spanner to draw together the parts of the split Micrometer nut. This nut is found by screwing back the thimble "A" till the nut is uncovered at the end of the sleeve "B." In making this adjustment the thimble "A" should be screwed back only so far as necessary to get at the tension nut with the spanner.

## Almond Standard End Measure or Gauge

**T**Hese gauges have hardened steel spherical ends and are very accurately adjusted. In using to test or adjust a Micrometer it should be held in a vertical position one end against the anvil and the other end moved about under the end of the screw, just touching the end of the screw, and the screw adjusted until the "feel" is just right. This is to insure the measurement being taken over the maximum length of the gauge and not over a smaller length that may be obtained by holding the gauge at an oblique angle to the measuring surfaces.



### Standard End Gauges

1 inch or 25 m/m.....	\$1.25
2 " " 50 "	1.25
3 " " 75 "	1.50
4 " " 100 "	1.70
5 " " 125 "	2.00
6 " " 150 "	2.25
7 " " 175 "	2.50
8 " " 200 "	2.75
9 " " 225 "	3.00
10 " " 250 "	3.25
11 " " 275 "	3.50
12 " " 300 "	3.75
13 " " 325 "	4.00
14 " " 350 "	4.25
15 " " 375 "	4.50
16 " " 400 "	4.75
17 " " 425 "	5.00
18 " " 450 "	5.25
19 " " 475 "	5.50
20 " " 500 "	5.75
21 " " 525 "	6.00
22 " " 550 "	6.25
23 " " 575 "	6.50
24 " " 600 "	6.75



## **Other Almond Products**

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**Almond Drill Chuck**

**Almond Flexible Steel Tubing**

**Almond Lathe Chuck**

**Almond Micrometers**

**Almond Right Angle Transmission**